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Evaluation of Drug and Antibiotic Utilization in an Egyptian University Hospital: An Interventional Study

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Introduction

Drug therapy is considered to be a chief component of patient management in health care settings, including primary health care. Although the benefits gained by patients from pharmacological interventions are precious, the risks of drugs themselves and the burden of inappropriate use cannot be overlooked. Moreover, the cost of medicine is a matter of great concern in both developing and developed countries. Among the various classes of drugs, antibiotics receive special attention as money is spent on them more than many other drug classes [1]. Some antibiotics also have specific side-effects and their extensive use can lead to the development of resistant microorganisms [2-5].

Studies on the prescribing behavior of physicians and the effectiveness of intervention techniques on the quality of health care in developing countries are extremely needed. However, guidelines for rational prescribing are either not available or not effectively implemented in many developing countries. In 1995, Hogerzeil described several strategies which have been tried, mostly in developed countries, to encourage rational prescribing [6]. Hospital formularies and special committees for treatment of infections have also been reported to be useful in reducing the misuse of drugs [7].

Objective

To assess the prescribing behavior in one of the teaching hospitals in Egypt; and to evaluate the impact of antibiotic control group intervention on the antibiotics prescribing behavior in the same hospital.

Method

In 2009, the antibiotics control group was formed in Kasr El Aini Teaching Hospital (Cairo, Egypt) to provide guidelines to practicing physicians about the use and abuse of antibiotics. The group was responsible for analyzing the pattern of antibiotic prescriptions and preparing guidelines for antibiotic use within the hospital. The group members are composed of a clinical pharmacist, a clinical pharmacologist and a microbiologist. The group produced guidelines related to antibiotics that were circulated to all physicians in the hospital. The guidelines emphasized the following: 1) the presence of up-to-date information about all antibiotics in the hospital; 2) the presence of methods and strategies for choosing appropriate antibiotics for a specific disease condition.

Twelve core quantitative indicators to measure key aspects of prescribing and the quality of health care have been developed and tested by the WHO Action Program on Essential Drugs and the International Network for the Rational Use of Drugs [8]. All these drug-use indicators were included in the current study. The percentage of visits resulting in a prescription was also analyzed to indicate the incidence of treatment without prescription.

Information related to patient care and health facility indicators were collected prospectively during the patients' visits to the hospital. Consultation time (expressed in minutes) was calculated by dividing the total time spent for a series of consultations by the number of consultations. The average dispensing time (expressed in seconds) was measured by dividing the total time for dispensing drugs to a series of patients who received the drugs by the number of these patients. The percentage of drugs actually dispensed and adequately labeled was checked after the patients had left the pharmacy. A record was maintained about the availability of key drugs and a current copy of the drug formulary during the time of the study. The study started in January 2009 and was completed in December 2009. To measure prescribing indicators, the study used data from patient records and prescriptions. Patient records and prescriptions from January to December 2008 were included for analysis.

The antibiotics control group guidelines were made available to physicians and several activities were organized by the antibiotic control group in their drive to increase awareness of the problems of irrational prescribing among the health care professionals in Egypt. For all drug-use indicators, information obtained from January to May 2009 was considered as information before intervention, and that from June onwards was considered as information after intervention. A total of 1200 patients were studied. The study was approved by the ethical committee of the hospital before the commencement of data collection.

The data were coded, entered and analyzed using *SPSS* (version 18). Frequency distribution was obtained. The Mann-Whitney test was used to ascertain significant differences between the values of two groups pre- and post-intervention for nonparametric data analysis. The level $P < 0.05$ was considered the cut-off value for significance.

Results

Results of the study of prescribing indicators (Table 1) showed that the average number of drugs prescribed per encounter was 2.7 before intervention and 2.5 after intervention. All drugs were prescribed by proprietary names, although they were included in the formulary in their generic names. It was found that 94% of visits to the health centers resulted in a prescription before intervention and it dropped to 86% after; the difference was statistically significant (P-value < 0.05). The percentage of prescriptions for antibiotics dropped from 49% before to 34% after intervention, which was also statistically significant (P-value

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< 0.05). The percentage of encounters with an injection dropped from 18% before to 16% after intervention, a non significant change. The average consultation and dispensing times were similar before and after intervention, and 97% of the dispensed drugs were adequately labeled before intervention and became 98% after intervention. Individual antibiotics prescribed before and after intervention are listed in (Table 2). Antibiotics commonly prescribed were penicillins (most frequently amoxicillin), far ahead of cephalosporins and erythromycin. Prescriptions for penicillins dropped after intervention, while erythromycin and cephalosporins prescriptions increased. There were minor changes for other antibiotics.

Discussion

In the current study, we conducted a survey using the drug-use indicators described by the WHO. To our best knowledge a few number of surveys about the quality of health care and prescribing behavior has been conducted in Egypt.

The average number of drugs prescribed per encounter and the percentage of encounters with an antibiotic prescription were higher than that reported in Yemen, Sudan, Malawi, Bangladesh and several other developing countries [9,10]. Such prescribing behavior may be related to both the physician's and the patient's attitude towards patient management.

The values of many of the indicators, such as the percentage of drugs prescribed from the essential drugs list or drug formulary, the percentage of drugs actually dispensed the availability of key drugs and the availability of copies of essential drugs lists or formularies were found to be good in the present study. Thus, it would appear that there is no need to spend more assets on these features. There is a clear need, however, to highlight that prescriptions should be written using the generic names of drugs.

The present study showed that the physicians were able to spend a reasonable amount of time for each patient encounter, much longer compared with the reports in Bangladesh, Indonesia and Nigeria [10].

Drug-use indicator	Before	After
Prescribing indicators		
Average number of drugs per encounter	2.7	2.5
Percentage of drugs prescribed by generic name	0	0
Percentage of encounters with an antibiotics prescribed	47	34*
Percentage of encounters with an injection	18	16
Percentage of drugs prescribed from PHC drug formulary	100	100
Percentage of visits resulting in a prescription	94	86*
Patient care indicators		
Average consulting time (minutes)	11.6	12.1
Average dispensing time (seconds)	85	87
Percentage of drugs actually dispensed	100	100
Percentage of drugs adequately labeled	97	98
Health facility indicators		
Availability of key drugs (%)	93	94
Availability of a copy of an essential drugs list or formulary (%)	100	100

Table 1: Results of the study of drug-use indicators before and after intervention.

Antibiotics	Percentage of total		Percentage share of antibiotics prescribed	
	Before	After	Before	After
Penicillins	37.5	26.8	78.0	70.0
Cephalosporins	4.5	5.6	8.0	16.0
Erythromycin	5.3	5.2	8.0	11.0
Tetracyclines	1.0	0.4	1.5	0.2
Sulfonamides	0.7	0.55	1.7	1.3
Aminoglycosides	0.6	0.15	1.3	0.8
Chloramphenicol	0.4	0.2	0.5	0.2
Other antibiotics	0.4	0.5	0.5	0.3
Anti-tuberculosis	0.1	0.1	0.5	0.2
Total	50.5	39.5	100	100

Table 2: Antibiotics prescribed as a percentage of the total drugs prescribed and as the percentage share of antibiotics prescribed before and after intervention.

This may be due to a lower patient: physician ratio compared with health care facilities in those countries.

Although the dispensing time appears to be reasonable, most of this time was spent in preparing the medication and labeling. For proper patient care, an appropriate amount of time should be spent by the pharmacist counseling the patient about safe use of drug, potential side effects and drug interactions. Unfortunately, it was not possible to study patient knowledge of correct dosage and patient satisfaction at this stage. A comprehensive study investigating patient perception of the health services, including pharmacy services, is going to start soon in the same teaching hospital.

Antibiotics are the most commonly prescribed class of drugs and have been reported to account for almost 50% of the pharmacy budget in hospitals [11]. It is also estimated that in many hospitals a very high percentage of antibiotics are inappropriately prescribed [12]. Common medical conditions in patients are upper respiratory tract infections, diarrhea, skin diseases and lower urinary tract infections. Half of all antibiotics prescribed were for patients with upper respiratory tract infections and diarrhea despite that the effectiveness of antibiotics in many cases of upper respiratory infection is questionable [13].

An insight into factors influencing the prescription of antibiotics may be helpful and contribute to more rational prescribing behavior. Easy availability of drugs is one of the causes of a high incidence of self-medication in developing countries [14-16]. Patient education regarding the use and abuse of antibiotics should also be considered as drugs can be easily prescribed or purchased without prescription in Egypt.

The efforts of the study group had a significant impact on the physicians' antibiotics prescribing behavior. The percentage of prescriptions with antibiotics decreased, particularly the most commonly prescribed antibiotic, amoxicillin. Prescription of antibiotics like tetracyclines and chloramphenicol also decreased. Such changes in the prescribing behavior may be due to underpinning of the knowledge of the adverse effects of different antibiotics and the availability of relatively safer alternatives.

It is important to note that this study has a limitation of having only one big teaching hospital to represent the Egyptian capital (Cairo). It is essential to extend the study to cover hospitals in other cities of

Egypt for investigating the drug utilization throughout the country. Moreover, this study needs to be repeated over time to maintain good quality of health care.

Conclusion

Rational use of antibiotics is an area where physicians can harmonize their efforts with a multidisciplinary team for assuring best possible drug use. The results indicate that a satisfactory standard has been maintained in several areas in the studied teaching hospital. However, the average number of drugs per encounter, the percentage of encounters with a prescribed antibiotic and the percentage of drugs prescribed by generic name are three areas which need further intervention to improve the quality of health care.

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